



INVESTIGATOR'S ANNUAL REPORT

United States Department of the Interior
National Park Service

All or some of the information you provide may become available to the public.

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Reporting Year: 2009	Park: Shenandoah NP	Select the type of permit this report addresses: Scientific Study	
Name of principal investigator or responsible official: John Young		Office Phone: 304-724-4469	
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Project Title (maximum 300 characters): HABITAT CHARACTERIZATION, GENETIC DIVERSITY, AND POPULATION ABUNDANCE OF AMERICAN GINSENG			
Park-assigned Study or Activity #: SHEN-00344	Park-assigned Permit #: SHEN-2007-SCI-0014	Permit Start Date: Jul 12, 2007	Permit Expiration Date: Sep 30, 2009
Scientific Study Starting Date: Jul 12, 2007		Estimated Scientific Study Ending Date: Sep 30, 2009	
For either a Scientific Study or a Science Education Activity, the status is: Completed		For a Scientific Study that is completed, please check each of the following that applies: <input checked="" type="checkbox"/> A final report has been provided to the park or will be provided to the park within the next two years <input type="checkbox"/> Copies of field notes, data files, photos, or other study records, as agreed, have been provided to the park <input type="checkbox"/> All collected and retained specimens have been cataloged into the NPS catalog system and NPS has processed loan agreements as needed	
Activity Type: Research			
Subject/Discipline: Plant Communities (Vegetation)			

Purpose of Scientific Study or Science Education Activity during the reporting year (maximum 4000 characters):

The Division of Scientific Authority (DSA) of the U.S. Fish and Wildlife Service is responsible for assessing the biological status of wild American ginseng (*Panax quinquefolius* L.) and determining that any exports will not be detrimental to the survival of the species. However, little quantitative demographic data exists for American ginseng, particularly outside the species' core range of the Appalachian Mountains, and little is known about its population characteristics in relation to harvest levels (Anderson et al 1993; Gagnon 1999; Ford 2000; Sanders and McGraw 2002; Farrington 2006). The DSA has relied on harvest data to measure general population trends of this species.

USGS scientists at the Leetown Science Center developed and field-validated landscape-level habitat models to predict the potential distribution of American ginseng within the core of its range (Thatcher et al. 2006, van Manen et al. 2005, Young et al. 2003). With

the inclusion of quantitative demographic data in the GIS-based computer model, information on the spatial distribution and abundance of American ginseng was provided to the DSA for the States that have the greatest harvest pressure (Kentucky, Ohio, Virginia, West Virginia, and Tennessee; Thatcher et al. 2006). However, the size of that study area represented only 4.2% of the entire range of the species. Very little information exists on the distribution and abundance of American ginseng outside of that area.

In addition for better distribution and abundance data, there is a critical need to better understand the genetic distinctions between wild and non-wild populations, and the genetic diversity among and within populations at a landscape scale (Schluter and Punja 2002; Grubbs and Case 2004; Cruse-Sanders et al. 2005).

This study will build upon previous research by complementing existing field data from 5 States with those from 12 additional States. The data will be integrated with data from the core range of the species, resulting in nearly range-wide estimates of the distribution, population abundance, and genetic diversity of American ginseng within the United States. We will combine habitat modeling and genetic analysis to determine the relationship between suitable habitats of wild American ginseng and the spatial distribution of genetic diversity of the species. Results of this analysis should help determine whether wild American ginseng populations are becoming genetically isolated due to over harvest of populations.

Specific objectives of this study are to 1) develop habitat suitability models for American ginseng within a study area covering portions of 12 states, 2) determine demographic parameters and population characteristics of sampled populations within the study area, and 3) determine genetic diversity and structure within and among sampled populations. We will contrast population abundances and genetic diversity between four classes of land stewardship: 1) public protected (National Parks, Wildlife Refuges, Wilderness areas, and other forest and parks where American ginseng harvest is not allowed), 2) public unprotected (public lands where American ginseng harvest is allowed), 3) private protected (private conservation lands such as Nature Conservancy holdings or conservation easements), and 4) private unprotected (all other private lands). The goal of this analysis will be to contrast American ginseng distribution, diversity, population structure, and protection status on private versus public lands.

Findings and status of Scientific Study or accomplishments of Science Education Activity during the reporting year (maximum 4000 characters):

In 2009 we finished DNA marker development and began analyzing genetics data from data collected in the field during 2007-2009. From this analysis, we have developed microsatellite DNA markers that include 106 alleles at 12 microsatellite loci for use in population discrimination. We are now in the process of fully assessing patterns of gene flow, population structure, and diversity within and among plants sampled in our study. We expect to complete the analysis and report by the end of 2010.

For Scientific Studies (not Science Education Activities), were any specimens collected and removed from the park but not destroyed during analysis?

No

Funding specifically used in this park this reporting year that was provided by NPS (enter dollar amount):

\$0

Funding specifically used in this park this reporting year that was provided by all other sources (enter dollar amount):

\$0

List any other U.S. Government Agencies supporting this study or activity and the funding each provided this reporting year:

Paperwork Reduction Act Statement: A federal agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. Public reporting for this collection of information is estimated to average 1.625 hours per response, including the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the forms. Direct comments regarding this burden estimate or any aspect of this form to Dr. John G. Dennis, Natural Resources (3127 MIB), National Park Service, 1849 C Street, N.W., Washington, DC 20240.